Carbohydrates (2010 Dietary Guidelines Advisory Committee)

Overview, Needs for Future Research

Overview:

The Committee first reviewed the 2005 Dietary Guidelines Advisory Committee (DGAC) report to inform their review process in 2010. Various topics in this section were also considered by the 2005 DGAC, including:

- Whole grains
- Vegetables and fruits
- Glycemic index and load
- Added sugars
- Liquids vs. solids.

Non-caloric sweeteners was a new question to be considered by a DGAC. For each of the Nutrition Evidence Library (NEL) systematic reviews, the following general criteria applied. All study designs were originally included in the searches, but cross-sectional studies were later excluded from the review if there was sufficient evidence from studies with stronger study designs. The Committee excluded studies that only included participants diagnosed with chronic disease, hyperlipidemia, hypertension (HTN) and related health conditions. Many systematic reviews and meta-analyses of primary research articles were considered by the Committee, and care was taken not to review the same study twice in the NEL evidence-based review.

For the topics considered by the 2005 DGAC, the Conclusions expressed in the 2010 DGAC report are informed by the evidence compiled for the 2005 DGAC report, but are based primarily on the NEL evidence gathered and reviewed since 2004. As discussed in the associated review, for some questions, the search was extended back further to capture a larger body of evidence. The Committee only considered studies that directly assessed the relationship between the intake of food groups and health outcomes; studies examining the intake of food groups as a part of a larger dietary pattern were not considered in the review.

Needs for Future Research:

1. Develop and validate carbohydrate assessment methods. Explore and validate new and emerging biomarkers to elucidate alternative mechanisms and explanations for observed effects of carbohydrates on health.

- **Rationale:** Studies of carbohydrates and health outcomes on a

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macronutrient level are often inconsistent or ambiguous due to inaccurate measures and varying food categorizations and definitions. The science cannot progress without further advances in both methodology and theory.

2. Develop definitions for whole grain foods and criteria for whole grain foods that can be universally accepted.

- **Rationale:** At present, there is no consistent way that whole grain foods are defined and determined. Without clear definitions for whole grain foods, it is difficult to compare research studies examining the effectiveness of various whole grains on biomarkers of interest in cardiovascular disease (CVD), diabetes and obesity. Clear definitions would also help consumers identify foods that can help them meet the Dietary Guidelines recommendation.

3. Conduct intervention and research studies with strong designs that include sufficient sample sizes over time and specific measures of vegetable and fruit intake, including specific types of vegetables and fruits, overall dietary patterns, exercise, sex and other confounding factors to evaluate the impact of consuming vegetables and fruits on health.

- **Rationale:** Rigorous methods of assessing dietary intake are needed along with rigorous measures of outcomes. Strong designs that control for confounding variables will provide deeper insight into the effect vegetables and fruits have on health. Plausible mechanisms for these effects also need to be studied in depth. Traditional markers, such as blood lipids, while useful for risk factor assessment, appear to have limited explanatory value.

4. Conduct long-term, randomized controlled trials (RCTs) to resolve whether use of nonnutritive sweeteners can actually aid weight loss or prevention of weight gain.

- **Rationale:** Currently available data are insufficient to recommend non-nutritive sweeteners as an aid to weight loss, except on a theoretical basis for calorie reduction.

5. Develop standardized assessment tools to determine accurate intake of added sugars.

- **Rationale:** This is challenging because carbohydrate methods are also limited, as total carbohydrate is measured “by difference.” Unless efforts are made to define and measure carbohydrates and carbohydrate fractions with potential health benefits, it will be difficult to determine if different carbohydrate types have different health effects.

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Acknowledgements

6. Develop innovative methods to evaluate “food form” as a variable in food intake studies for the field to progress.

- **Rationale:** Unless macronutrients are carefully controlled, it is not possible to answer the question on how food form affects energy intake. These questions will remain unless RCTs are conducted that measure differences in exposure to different carbohydrates (glucose, fructose, sucrose) and different forms (liquid, solid, whole food).

7. Develop methods for use in epidemiologic studies to measure accurately or quantify intake of liquids, either caloric or non-caloric.

- **Rationale:** There has been an increase in the number of beverages available, and it would be valuable to know how these beverages are contributing to satiety, energy intake and body weight. Drinks can include a wide range of macronutrients and artificial sweeteners are difficult to assess with food frequency instruments. The type of drinks consumed now includes sport drinks, designer coffees and teas, smoothies and juices and carbonated beverages with different sugars or artificial sweeteners.

8. Determine whether the effects of vegetables and fruits in the overall dietary pattern are due to displacement of other foods in the diet or to the action of vegetables and fruits, per se, on specific health outcomes.

- **Rationale:** The mechanism(s) of action for the effects of vegetables and fruits have not been determined and, therefore, may vary for different health outcomes. The observed effects could be a simple displacement of these foods with other foods that cause poorer outcomes, or vegetables and fruits may contribute specific benefits or a combination of the above may explain the observations made thus far in the literature. Only further research can provide more definitive answers.

9. Identify whether a progressive, inverse relationship of fruits and vegetable consumption exists with the prevention of chronic disease(s) or whether there is a threshold effect that may vary depending on factors such as disease, sex or dietary pattern.

- **Rationale:** The evidence suggests that there may be a threshold effect of vegetables and fruits, at least within the American dietary pattern, but further research is needed to verify this hypothesis and to test whether the threshold varies among a variety of dietary patterns or among the specific variety of vegetables and fruits consumed
- **Rationale:** Studies of carbohydrates and health outcomes on a

macronutrient level are often inconsistent or ambiguous due to inaccurate measures and varying food categorizations and definitions. The science cannot progress without further advances in both methodology and theory.